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# *The implications of how climate funds conceptualize transformational change in developing countries*

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**Abstract**

The search for globally coordinated mitigation strategies that could contribute effectively towards bridging the gap between current emissions reduction efforts and a rapidly closing 2°C climate target remains contentious. The participation of developing countries through Nationally Appropriate Mitigation Actions (NAMAs) is emerging as a crucial feature to attain this goal. Against this background, two of the major NAMA funding agencies have embraced 'transformational change' and 'paradigm shifts' as policy concepts. Yet, their operationalization within aid management approaches has not been fully justified. Concurrently, academic interest in theories of sustainability transitions has been growing, out of which the Transition Management (TM) approach provides the theoretical inspiration to study, and eventually promote, systemic transformational changes. However, there is still limited knowledge with which to contextualize the steering of such transitions to different settings. This article engages in these debates by reviewing the theoretical grounding behind the Green Climate Fund and the NAMA Facility's conceptualizations of transformational change through NAMA interventions against the corresponding theoretical assumptions of TM. Based on a critical review of relevant literature, it is argued that the logical framework-based approach adopted by the funds contains implicit assumptions of causality, which do not adequately cater for the uncertainties, non-linearity and feedback loops inherent in transition processes. The incorporation of more adaptive and reflexive elements is proposed as an alternative. This paper contributes to existing knowledge by critically reflecting on the applicability of TM towards governing sociotechnical transitions in the developing world and by exposing the limitations behind the current thinking underpinning NAMA funding. In conclusion, the systems perspective adopted in sustainability transition theories is thus recommended as a more rewarding approach towards understanding how attempts at transforming paradigms through support to climate policies and actions in developing countries are played out

**Keywords:** Climate change mitigation policies and actions, Transition Management, Logical Framework, Transformational Change, Development Aid

## 1. Introduction: understanding the notions of transformational change (TC)

The adoption of the 'transformational' concept by two major players of climate financing in developing countries through Nationally Appropriate Mitigation Actions (NAMAs) is the starting point for this paper. NAMAs have emerged as a mitigation mechanism under the United Nations Framework Convention on Climate Change (UNFCCC) to encourage up-scaled mitigation initiatives by non-Annex 1 parties. Being defined by a host country, there is no formal definition of NAMAs.[1] However, they typically consist of a mix of policies and measures, thereby implying a strong role for government interventions geared towards providing a conducive environment for private investments, and with the potential to contribute significantly to reducing greenhouse-gas emissions. In that sense, NAMAs expand the scope of internationally coordinated mitigation options by developing countries from the project thinking of the Clean Development Mechanism to NAMA policies and measures to achieve national climate and development goals. Despite the fact that NAMAs have not been explicitly acknowledged under the recently agreed Paris Agreement, they are nonetheless accepted by developing countries, international organizations and the UNFCCC as a mitigation instrument with which to operationalize the political commitments countries have agreed to within Nationally Determined Contributions (NDC).

Since their first conceptualization in the Bali Action Plan (UNFCCC 2007b), NAMAs have been associated with a number of desirable characteristics. For example, they are required to be measurable, reportable and verifiable, while being integrated into the context of a nationally defined sustainable development agenda (UNFCCC, 2007b, p. 3). Transformational[2] objectives have recently been flagged as another crucial feature (GCF 2014a; NAMA Facility 2015). Winkler and Dubash (2015) trace the origins of this terminology within climate circles back to September 2011, in the build-up to the creation of the Green Climate Fund (GCF). Subsequently, authoritative actors and scholars involved in climate mitigation issues have formulated interpretations of the term.

Related guidelines of major entities concerned with climate, such as the Intergovernmental Panel on Climate Change (IPCC), the UNFCCC Secretariat, the GCF and the NAMA Facility, reveal that, to date, there has been neither an agreement on the exact meaning of TC, nor consensus on what it entails. However, the definitions employed reveal that the term is broadly described either with reference to the characteristics of a mitigation or adaptation initiative or in terms of its outcomes in order to become transformational. The IPCC distinguishes between transformation as a change in the underlying properties of natural and man-made systems and transformation pathways relating to development trajectories implying *'a set of economic, technological and behavioural changes*' (IPCC, 2014, p. 128). The UNFCCC secretariat understands TC within the context of NAMAs as mitigation actions with a sectoral or national focus being undertaken through the crucial leadership of government (UNFCCC, n.d.). While differentiating between mitigation and adaptation components, the GCF uses the term *'paradigm shift*' (GCF, 2014b, p. 6) to describe the fund's ultimate ambition and the degree to which NAMAs promote low-emissions sustainable-development pathways. The NAMA Facility adopts a similar pathway understanding, distinguishing TC as a self-reinforcing process distinct from other characteristics of NAMAs (NAMA Facility 2014).

While recognizing the importance of defining TC, Winkler and Dubash (2015) caution against rigid understandings which could undermine country ownership. Mersmann and Wehnert

(2014) suggest a process-based interpretation and define TC as '*a structural change that alters the interplay of institutional, cultural, technological, economic and ecological dimensions*' (Mersmann and Wehnert, 2014, p. 10). Building on this, Mersmann et al. (2014) have contextualized their initial definition to NAMAs by including a goal direction provided by concerns for sustainable development, while TC is understood as a descriptive concept covering the processes and depths of change required. These different ways of depicting TC within the climate context are indicative of the early days of attempts to operationalise urgent and coordinated mitigation responses with significant long-term developmental impacts on the developing world.[3]

A universal definition of TC contrasts with principles of sovereignty within the UNFCCC. Concerns for carbon-colonialism (Winkler and Dubash, 2015), the mismatch of expectations between support-providers and NAMA-developers (Fridahl, Hagemann, Roser, and Amars, 2015) and the careful word-crafting employed by the GCF and the IPCC (IPCC 2014b)[4] exemplify the potential controversies deriving from this dichotomy. However, categorising TC as yet another political concept along the lines of terms such as 'nationally appropriate' or 'sustainable development' is problematic. While recognising that intentional vagueness or constructive ambiguity (Robinson 2004) promotes wider actor participation, a lack of clarity on TC also entails a risk of the term becoming rhetorical, ungrounded and representing a means to circumvent formal mitigation targets. This argument is especially relevant when issues of the comparability, accountability and replicability of NAMAs are at stake. Acting as the link between the developing world's mitigation initiatives and access to financing, climate funds' understandings of transformational NAMAs, as well as the approaches adopted in granting access to finance, therefore have a crucial role to play.

Established in 2010 and 2012 respectively to channel financial pledges from developed countries of the order of USD 100 billion a year by 2020, the GCF and the NAMA Facility are two of the major players in developing-country climate-financing (Green Climate Fund n.d.; NAMA Facility 2016). While the GCF was born out of pressures from developing-country negotiators to capitalize on the financial pledges made at COP 15, the NAMA Facility was initially created by the German and UK governments with the additional aim of tackling hurdles limiting access to finance from existing public and private channels to support the implementation of innovative NAMAs. Confronted with a need to achieve short-term and tangible mitigation and development impacts while being accountable for the effective and efficient use of public support, the climate funds have embraced the concept of TC within their approval structure. However, in this article, it is argued that the operationalization of TC for funding NAMAs through the two funds may be hampered by the reliance on logical framework thinking as a long-standing causal model in development cooperation. Criticisms of the Logical Framework Approach (LFA) (Gasper 2000) raise issues regarding its scientific coherence and its ability to capture long-term transformational processes. A growing body of knowledge that explicitly tackles such processes has been gaining prominence, namely theories of sustainability transitions.

Academic work on means to promote and manage transitions covers a range of different approaches (Markard, Raven, and Truffer, 2012). Within such scholarship, theories of sustainability transitions have developed rapidly in recent years.[5] In essence, these theories have mostly been used to study transitions based on historical data. However, out of this body

of knowledge, Transition Management (TM) emerges as the only theoretical framework that is explicitly prescriptive and normative. Devised as a governance approach towards sustainable development (Loorbach 2010), TM thus offers the possibility to undertake a comparison exercise with another planning methodology.[6] The TM literature has mostly focused on studying policy experiments in developed countries, especially in the Netherlands. Scholars have thus queried its relevance in other sectors and countries and at other scales. Currently, attempts to link transition theories with development aid have been rare, with a few notable exceptions (Arkesteijn, van Mierlo, and Leeuwis, 2015; Byrne, Smith, Watson, and Ockwell, 2011). Despite its limitations as a relatively new and yet to be developed method (Frantzeskaki, Loorbach, and Meadowcroft, 2012), the TM approach does provide fertile ground to enable a comparison, at a theoretical level, with assumptions made by climate funds targeting TC. An assessment of how TM, as a model rooted in theory, can offer a new perspective on TC compared to current approaches to climate finance has not been attempted before. In so doing, this article also contributes to Byrne et al. (2011)'s call for a *'more systematic evaluation of multilateral funds and mechanisms that are designed to foster low-carbon innovation in developing countries*' (p. 62). To this end, the research question pursued in this paper is the following: *To what extent are current LFA-based management approaches of climate finance able to capture the characteristics of transformational change processes set out by the scientific literature on Transition Management, and consequently, how can such approaches be improved?*

The main argument of the article is that the TM approach is better suited than current LFA-based approaches to operationalizing TC in developing countries. Section 2 details the methodology that is proposed to capture and compare the theoretical assumptions behind TM and the LFA-influenced operationalization of TC within the funds. Section 3 covers the literature reviewed and unpacks the conceptualizations of TC within the GCF and the NAMA Facility. Section 4 presents the results obtained and compares the two management approaches, while Section 5 exposes the limitations behind the current thinking in NAMA funding, argues for adopting a TM perspective, and suggest avenues for further research. The article concludes by proposing better ways to integrate processes of transformational change within the current approval structures of the climate funds.

## 2. Methodology

Methodologically, this article hinges on a critical review of the relevant literature, with a focus on how TC is conceptualized. The theoretical assumptions behind TM are identified by analysing a sample of its most influential publications. The exercise is guided by tracing TM's intellectual roots to Rotmans, Kemp and Van Asselt's seminal paper (Rotmans, Kemp, and Van Asselt, 2001), which subsequently spurred the development of TM's theoretical foundations into a model of governance. The state of the art of TM is drawn across the most frequently cited articles and review papers within the Scopus Database that stems from Rotmans et al. (2001)'s work. Out of this selection, the most influential scholarship that explicitly discusses the theoretical basis of TM is subsequently screened out (summarized in Appendix 1). While the term 'transition management' is covered with varying degrees of focus across the literature on sustainability transitions, a sample of papers that present the origins of TM is better able to discuss its theoretical grounds.

With a view to unpacking the GCF and the NAMA Facility's conceptualizations of TC, relevant documents defining their approach are reviewed. These consist of the GCF's governing instrument, its operations manual, the decisions of its board and its results management framework. Corresponding literature from the NAMA Facility is explored from its general information document, application forms, published fact sheets and reports. Based on these documents, it is evident that the two funds have adopted a mixture of the LFA and Theory of Change (ToC) approaches to operationalize TC through NAMAs.

In essence, the theoretical roots of LFAs and ToC hinge on a similar conceptualization of processes of change (see section 3.3.). This resemblance is unsurprising, since they both originate from the same family of approaches within 'programme theory' (Prinsen and Nijhof, 2015; Vogel, 2012). This common feature also indicates that both approaches are based on similar fundamental theories. Based on this understanding, these theoretical assumptions are identified through a review of the LFA literature first to showcase how LFA thinking prevails through the funds' understanding of TC, and secondly to undertake a like-for-like comparison with the assumptions made within TM.

The body of literature that relates to the LFA is richer and more diverse than that on TM. Adopted as a practical project-evaluation tool by USAID in the late 1970s (Rosenberg and Posner, 1979), it has since been adopted by major development aid agencies. Its longevity and broad application has resulted in its extensive coverage within the grey literature. However, since the focus of the current exercise relates to a drawing out of the LFA's underlying theoretical assumptions, an alternative method that focuses only on academic publications is applied, thereby deliberately screening out grey publications related mostly to practical applications of the approach and focusing instead on more in-depth discussions of the LFA's logic. The search is restricted to peer-reviewed articles (articles, reviews and articles in press) published from 1999 to date on the Scopus Database for 'logframe', 'logframes', 'log frame', 'log frames', 'logical framework', 'logical frameworks'. To ensure a balance between the TM and LFA reviews, an equivalent sample of the most cited articles that explicitly discuss the theoretical rationale behind the LFA (*summarised in Appendix 2*) is examined.

Based on this exercise, three analytical dimensions are identified as central in capturing the underlying theoretical assumptions of how TC is conceptualized according to both approaches.[7] These consist of: (1) how change processes are envisaged, (2) the proposed management responses that follow these change processes, and (3) how the roles of various actors are envisaged. To explore the prevalence of linear LFA thinking in the two funds, the three analytical dimensions are used to explore how the two funds understand TC. The results of this exercise are compiled in Table 1.

The next section reviews the literature, followed by a summary of the results of the comparison exercise.

## 3. Theoretical and empirical perspectives

### 3.1. *Sustainability transition theories*

Core research strands dealing with sustainability transitions boast a number of different approaches and schools of thought. To delineate the contours of this field, sustainability transitions are defined as '*long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption*' (Markard et al., 2012, p. 956). Sustainability transition theories provide useful ways of analysing transitions.[8] However, the theoretical frameworks provide different analytical possibilities. For example, while 'Arenas of Development' theory (Jørgensen 2012) explore transitions through the performance of actors in stabilizing or changing relations, 'Practice Theory' (Shove and Walker, 2010) correspondingly focuses on the dynamics of social practices. 'Technological Innovation Systems' (TIS) analyse technological change by focusing on the structure and function of innovation systems (Hekkert, Suurs, Negro, Kuhlmann, and Smits, 2007), while 'Strategic Niche Management' (SNM) suggests that the setting up of protective spaces can enable technologies to flourish within sustainable innovation pathways (Schot and Geels, 2008). Assuming that sustainable development requires simultaneous consideration of inter-related social and technical issues, SNM posits that niches can allow nurturing and experimentation with the co-evolution of technology, user practices and regulatory structures. Specifically, SNM focuses on the design and dynamics of niches such that previously unconnected actors from different fields create networks, articulate shared expectations and learn by doing so as to favour the emergence of more sustainable patterns. TM expands the SNM approach within cyclical participatory processes of searching, learning, testing, exploring and adapting problems and solutions (Loorbach 2010).

Scoping the review down to literature that adopts an explicitly forward-looking perspective, TM emerges as the only branch in transition studies which is not solely limited to retrospective analyses and that relates the most to governing a purposive transition (Smith, Stirling, and Berkhout, 2005).

### 3.2. *TM's perspective on transformational change*

Originating in policy experimentation in the Netherlands, TM is a hybrid research field in the transitions literature. Building on multilevel perspective studies, it was coined on the basis of an idealised 'S' curve characterizing transitions through time within phases such as pre-development, take-off, acceleration and stabilization (Rotmans et al. 2001). Taking a social challenge such as energy security as its point of departure, TM emphasizes the dynamics of co-evolutionary processes of change that are informed by lessons learned through implementation (Rotmans and Loorbach, 2009). By bringing strategic thinkers from different backgrounds to interact and gain a wider insight into the issues at hand within 'transition arenas', TM posits that these actors will be empowered to redefine their problems and perspectives and subsequently to re-assess the goals that have been set. Such goals are further translated into long-term visions that guide the formulation of strategic activities while ensuring public support via 'transition agendas'. Through back-casting these visions to present situations, transition paths (or 'transition scenarios') are devised and strategies to realize the visions attempted through 'transition experiments'. Continuous monitoring and evaluation of processes and outcomes is used to program revisions.

These features are delineated across activity levels targeting multilevel perspective categories of landscapes, regimes and niches respectively: long-term strategic envisioning of cultural and social change, mid-term tactical activities translating these visions into pathways, and short-term operational activities focusing on actors and the actual execution of projects (Loorbach 2010). Such activity clusters are tied across time within cyclical phases, and their elements are reassessed through reflexive activities via monitoring and evaluation.

TM is rooted in an understanding of transitions as being inherently systemic, and it attempts to incorporate this feature within a cyclic model. Transitions are claimed to occur within a participatory and deliberative process of social learning that occurs within protected spaces for experimentation. Such processes occur when key actors (or 'frontrunners'), in a search to find solutions to a social challenge, question and engineer a shift in the deep structures upon which their belief systems, ideologies and opinions are based. Through trial and error, and by aligning problems and solutions along the way, TM suggests that novel practices can mutually reinforce each other such that niches can compete with or change dominant practices. These features are based on a number of theoretical assumptions that branch out into a growing body of knowledge covering TM.[9]

### 3.3. *Logical Framework Approaches and Theories of Change*

Originating in corporate and military planning, the LFA's ability to provide structure, hierarchy and rational thinking when designing projects has led to it becoming a classic tool in aid management. In a nutshell, LFAs assume a linear causality chain for a particular project activity. Despite numerous conceptions of the LFA model (Crawford & Bryce, 2003), its fundamental theoretical perspective has remained the same (*Ibid.*). Within the international development community, it is understood as a tool through which programme inputs can lead to programme goals via activities, outputs and outcomes in a logically coherent way. These elements shine through both the GCF and the NAMA Facility's approaches to granting NAMA financing.

For example, the board of the GCF decided that '*... in designing a logical framework for results management, the Fund will develop indicators to measure the impact of the Fund…*' (GCF 2014a, p. 2), which are embedded within a logic model that describes '*…how inputs and activities are converted to changes in the form of results achieved at the project/programme, country, strategic impact and paradigm shift levels*' (GCF 2014a, p. 3). The NAMA facility, on the other hand, specifies that it will assess NAMA Support Programmes '*on the basis of the logframe, the M&E plan and the reports provided…*' (NAMA Facility, 2015, p. 23.), which subsequently feeds into its overall ToC model, described as

> *showing what the facility is meant to do and what it is to achieve on different objective levels (road map). It is based on a series of 'what-if' relationships that, if implemented as intended, lead to the desired outcome.* (NAMA Facility, n.d.-b, p. 1)

ToC primarily expands the LFA to incorporate longer chains of cause and effect relationships, focusing attention on the longer term impacts of an intervention and on its underlying assumptions, and arguing for the improved integration of complexity features and beneficiaries' views (Prinsen and Nijhof, 2015). ToC advocates also claim that the approach is more critical, reflexive, and potentially bridging the attribution gap of the LFA (Vogel 2012). However, the ToC approach is simultaneously criticized for being data-intensive, experiencing

caveats in attributing the failure of an intervention to the theory itself or to weak management, and still exhibiting limited usefulness in capturing complex processes and stakeholder perspectives (Prinsen and Nijhof, 2015). These criticisms detract from the value of its claimed benefits.

Furthermore, the argument that ToC can bridge the attribution gap between the outputs and outcomes of a planned intervention is doubtful. Isolating and assigning the effect of a single intervention from various mutually reinforcing processes occurring at different intervention levels and from different partners within international aid is widely recognised as difficult to capture. Describing the Danish development assistance experience (Ulbæk and Nøhr, 2014) use the notion of contribution rather than attribution. In short, while ToCs claim to constitute an improvement as compared to the LFA approach, both approaches are grounded on an understanding that a planned intervention can be articulated through sequential cause and effects relationships (Weiss 1997). The next section unpacks the conceptualizations of TC within the GCF and the NAMA Facility, followed by an analysis of how the theoretical assumptions of the LFA approach impact on how the funds conceptualize TC.

### *3.4. Climate funds' conceptualizations of transformational change*

Within the documentations of the two funds (section 2), two different dimensions are distinguished through which TC transpires: first, through the performance assessment conditions; and secondly, through the management approach. Within the first dimension, Mersmann and Wehnert (2015) identify two further levels of operationalization of the concept: fund governance level and intervention level.

*Performance assessment conditions*

Both the GCF and the NAMA Facility specify that their fund-level impacts will be monitored and evaluated, with the former aiming to influence global emissions levels and the latter targeting impacts at the country level. Zooming into the operational conditions imposed at the intervention level, both funds lay down evaluation requirements for NAMAs submissions according to pre-defined criteria. Notwithstanding the GCF's additional mandate for adaptation, the major difference between the sub-criteria used by the two funds relate to the GCF's requirement for a proposed intervention to set out its contribution to knowledge and learning. While, in another publication (NAMA Facility 2014), the NAMA Facility has stated that it also considers systemic learning processes to be an important factor conducive to TC, they are not articulated explicitly within their funding criteria (NAMA Facility, 2015, p. 17) at an intervention level. Capturing lessons learnt is envisaged as the mandate of the Technical Support Unit of the facility (NAMA Facility, 2015, p. 9). However, the modalities of such knowledge exchanges are not made explicit. The GCF also does not specify how lessons learnt within a planned intervention can be harnessed and fed back to revise its design. These features indicate that both the GCF and the NAMA Facility focus on reaping lessons learnt across NAMAs, rather than within a NAMA initiative.

*Management Approach embedding the fund, and intervention levels of the operationalization of TC*

Within the methodologies employed by both agencies, a causal model-based approach to structuring and approving NAMA financing (GCF, 2014b, p. 51 and NAMA Facility, 2015, p. 6) has been explicitly adopted. As such, both funds have devised performance management

frameworks that infer linear causality linkages within and between intended levels of intervention. While the NAMA Facility has expressed a requirement for NAMA proposals to be framed so as to feed into its overall ToC (NAMA Facility n.d.), the GCF has set out its mitigation logical framework across vertically linked hierarchies of inputs, activities and outputs at the country level, which feed into the fund's impact level and ultimately into a global paradigm shift level (GCF, 2014a, p. 11). Furthermore, both funds require applicants to produce a logical framework matrix (see NAMA Facility, n.d.-a (2015) and sections H.1.1 and H.1.2 in paragraph 4.6 of GCF, n.d.). These common features clearly demonstrate the influence of LFA thinking in the conceptualization of TC at the intervention level. However, when moving up the linkages that connect to a fund level, the two entities slightly diverge in their thinking. In incorporating some feedback loops within its ToC model, the NAMA Facility explicitly describes how it envisages incorporating lessons learnt from different NAMAs that have been implemented. The GCF also mentions that lessons learnt will be used to revise its methodology (GCF, 2015, p. 7). However, to date, its intervention logic does not explicitly provide for feedback mechanisms.

In short, both funds are attempting to govern developing country-driven, large-scale mitigation actions within country-defined sustainability principles. The assumption is that the proposed transformational NAMAs can be expressed in terms of a phased sequence of causes and effects, with the traditional LFA approach being adopted at the intervention level, and expanding to notions of ToC at a wider fund level. With a view to better exploring how LFA thinking shines through the funds' conceptualization of TC, the relevant LFA literature has been reviewed based on the methodology specified in Section 2 to reveal its theoretical basis. These are further detailed in Appendix 2.

Based on the analytical categories identified earlier, the theoretical assumptions behind TM, LFAs and their operationalizations within the GCF and the NAMA Facility are unpacked. These results are compiled and compared in Table 1, which is followed by a discussion section.

### *4.0. Comparing and contrasting the TM approach and the LFA-influenced funds' approach*

| **Analytical Dimensions** | ***Theoretical assumptions within:*** | | | |
|---|---|---|---|---|
| | ***TM approach (circular approach)*** | ***LFA (linear approach)*** | ***Intervention Level of GCF and NAMA Facility*** | ***Fund Governance Level of GCF and NAMA Facility*** |
| *Change Processes* | • Multiple, simultaneous, and occurring at different levels<br>• Complex, non-linear with multiple causalities and feedback loops<br>• Inherently uncertain<br>• Modular, sequential and path-dependent<br>• Iterative, Co-evolutionary, adaptive and self-reinforcing | • orderly, relatively well understood<br>• predictable, controllable change<br>• chain of linear causality<br>• change are factored along hierarchal vertical and horizontal logics<br>• change processes are dependent on pre-set assumptions | • Same assumptions for change processes as LFA thinking applies when the use of the LFA matrix is mandated (GCF n.d.) and (NAMA Facility n.d.; NAMA Facility 2015)<br>• Requirement for specifying a ToC, implying an expansion of the chain of causality, with some feedback loops (GCF, 2015, p. 10) and (NAMA Facility, 2015, p. 20) | • GCF has made its mitigation logic model explicit (GCF, 2014a, p. 11) while the NAMA Facility has devised a ToC model (NAMA Facility n.d.))<br>• The same theoretical assumptions of change processes as the LFA methodology, except the NAMA Facility's explicit expression of feedback loops |
| *Management Approach* | • Objectives and pathways are not rigid<br>• Strategic re-orientation by articulating pressures informed by interactive learning processes<br>• Integrated by combining top- | • top-down linear style of management that assumes powers of control<br>• assumes universality of scientific rationality and that the world exhibits objective cause-effect relationships<br>• assumes that the sum of efficient inputs must at some future time lead to intended results | • Similar assumptions at a management approach dimension as that of LFAs apply.<br>• Exception: logic of the project design may be amended either at mid-course or end of project stages<br>GCF: mid-course evaluation on case by case basis (GCF, 2014c, p. 10);<br>NAMA Facility includes | • The same assumptions for management approach as that of LFA apply<br>• Exception: the funds' logic may be amended occasionally<br>(GCF accounts for the possibility of review over time (GCF, 2014c, p. 21)<br>NAMA Facility's Technical Support Unit is mandated |

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| | down with bottom-up perspectives<br>• Existing governance structures can be creatively destroyed<br>• Focus on system innovation rather than optimization<br>• Relies on market forces<br>• Relies on decentralized decision-making<br>• Assumes political feasibility of experimentation | • assumes the logic of the project design will maintain its coherence during implementation<br>• factors external to the intervention, risks and uncertainties are considered as assumptions required for a project story to happen<br>• assumes that it is possible to define objectively verifiable indicators and means of verification corresponding to a pre-defined targeted level of impact<br>• assumes powers of attribution | possibilities for mid-course or end of project evaluations (NAMA Facility, 2015, p. 23) | to review the fund's performance (NAMA Facility, 2015, p. 9) |
| *Role of Actors* | • Actor interests are assumed to be well organized<br>• Conflicts are viewed as necessary, are encouraged and assumed to be controllable<br>• A strong role is assumed for government and frontrunners operating outside | • assumes an influential role during design phase<br>• assumes that target groups are adequately defined and continuity in participation<br>• assumes clear objectives are defined and a high degree of consensus on what is feasible, valuable and measurable<br>• assumes limited interactivity and changes in actors' and | • Access to funding from GCF is granted through accredited entities via approval from a National Designated Entity. Proof of a consultative process is required (see governing instrument on (UNFCCC, 2011, p. 64), including a multi-stakeholder engagement plan (para E.5.3 of funding proposal template on (GCF n.d.)) | • Actors at the national level do not have a significant role to play at a fund level.<br>• The GCF's conceptualization of TC may be reviewed through an Independent Evaluation Unit (GCF, 2014c, p. 20)<br>• The NAMA Facility may reap lessons learnt through implementation and review its ToC through its Technical Support Unit |

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|---|---|---|---|---|
| | dominant policy networks<br>• Facilitation is claimed to be able to bring a change in perspectives | networks' interests and logics<br>• restricted iterative learning except when project managers reassess project design<br>• assumes strong leadership and facilitation skills<br>• assumes high powers of foresight | • Access to funding from the NAMA Facility is granted through delivery organizations and implementing partners (NAMA Facility, 2015, pp. 11 - 12). The NAMA Facility requires strong commitment from national government (NAMA Facility, 2015, p. 12), involvement of local public or private entities, possibly a national development bank, stakeholders defined, roles and objectives clearly spelt out, realistic project hypotheses, activities, outputs, and long-term impacts spelt out (NAMA Facility, 2015, p. 17 - 19).<br>• The same assumptions as those of LFA apply | • With only the GCF having explicitly detailed its mitigation logic according to results based management framework, the same assumptions as those of the LFA will apply. |

**Table 1. Contrasting the theoretical assumptions of TM, LFAs and the funds' conceptualizations of transformational change.**

*Change processes*

While both the TM and LFA are simplified models which adopt a high level of generalization for the purposes of managing change processes, they differ in how such processes are assumed to occur. The LFA sees change as being essentially orderly, predictable, and dependent on foreseen conditions. The methodologies adopted by the two funds do not completely follow this approach, as exemplified by the requirement for NAMA proposals to be framed according to a logical framework matrix and concurrently for such interventions to mention their ToC. While the former requirement infers straightforward linear causality, the latter implies the integration of some feedback loops. Nonetheless, both requirements suggest a conceptualization of change processes within the two funds as orderly, understandable, predictable and controllable, as well as dependent upon pre-set assumptions inherent in LFA thinking. TM differs considerably from this perspective: change processes are considered fundamentally unpredictable due to multiple processes occurring simultaneously at different levels. Its systems perspective, which simultaneously considers social and technical processes, is claimed to be a better way to integrate features of uncertainty, complexity, multiple causalities and feedback loops. This fundamental difference in theorizing change processes leads to different assumptions about proposed responses, whether along a management approach or in terms of the role of actors.

*Management Approach*

While aiming at providing a structure and hierarchy to objective oriented planning, both the TM and LFA approaches adopt a technocratic perspective towards handling planned interventions. However, their management approaches are based on different theoretical assumptions.

The LFA is essentially a top-down engineered approach that claims high powers of control. It focuses on the intended effects through intended routes based on hypothetical cause–effect relationships discovered through structured observation. It is built on an a priori project narrative that asserts the logic of a designed intervention, assuming it will maintain its coherence during implementation. The LFA adopts a positivistic methodology that assumes the universality of scientific rationality. By postulating that complex processes can be divided into a series of quantifiable fragments adding up to a desired objective, the LFA adopts a reductionist perspective that oversimplifies complex and non-linear human-centred change characteristics (Armytage 2011). It also assumes that it is possible to define indicators and means of verification objectively. The LFA approach remains silent on issues that can arise during implementation, but still claims to have powers of attribution with respect to higher-level objectives. These features are prevalent within the two funds' conceptualizations of TC, which are incorporated within their individual logical framework-based causal models. The main difference with the totally rigid interpretations of LFAs lies in the possibility for the GCF and the NAMA Facility to undertake some design revisions over time at both the intervention and fund governance levels.

On the other hand, TM internalizes context by viewing transformational processes as co-evolutionary, self-reinforcing and adaptive. Goals and strategies are not rigidly defined, and an iterative methodology is proposed, based on strategic reorientation through articulated pressures, and guided by interactive lessons learnt during implementation. TM thus combines top-down with bottom-up approaches and focuses on system innovation rather than

optimization. This claim rests on the assumption that decentralized decision-making and the creative destruction of governance structures is politically possible. Another key difference lies in the explicit recognition within TM of the importance of experimentation in managing transitions, which incurs both a high risk of failure and a high potential for gain. The approach adopted by the two funds, on the other hand, does not explicitly assume trial and error features but assumes rather that consensus prevails on pre-determined goals, strategies and indicators of progress.

*Role of actors*

The TM and LFA approaches both claim to be able to take into account the concerns of multiple actors. However, there is little guidance in either regarding the rationale for participation and the mechanisms to integrate differing priorities. Project designers using the LFA are assumed to have high powers of foresight and the ability to define clear objectives. This assumes a high degree of consensus among the actors involved in implementation regarding what actions are feasible, valuable and measurable. Another important assumption is that of continuity in participation by the same actors from the design stage throughout the project cycle. Actors are assumed to be most important at the design stage, whereas interactivity during implementation is considered less significant, with assumptions of limited change in interests, logics and other political dynamics over time. This feature limits interactive learning. Through embracing LFA thinking and ToCs within the GCF and the NAMA Facility's operationalizations of TC, these features are implicitly reproduced within the funds. In the absence of clear stakeholder participation guidelines by both funds, it is difficult to ascertain the role of actors in evaluations of TC at the fund governance level. While the GCF's adoption of a results-based framework suggests that evaluations of the funds' performance are strongly linked to LFA's theoretical assumptions regarding the role of actors, the NAMA Facility has not made public how its Technical Support Unit will undertake a similar assessment.

On the other hand, TM views actors' concerns as being dynamic in nature, evolving with knowledge gained during implementation. Such a view assumes that actors' interests are well organized and that facilitation alone can bring about a major change in perspectives. TM also assumes a strong role for government, as well as for actors operating outside dominant policy networks. These actors are also assumed to be able to influence those policy regimes. None of the funds adopt the TM approach in order to enable actors outside the NAMA intervention to play an active role as change agents, but rather rely on the LFA approach, which does not support interactive and reflexive learning, management or the implementation of change.

## 5.0 Discussion

### *5.1. Criticism of the climate funds' understandings of transformational processes*

The academic literature has highlighted the various shortcomings of the LFA (Bell, 2000; Crawford and Bryce, 2003; Dale, 2003; Gasper, 2000b; Hermano, López-Paredes, Martín-Cruz, and Pajares, 2013, Olsen 2006). These include criticism of its rigidity, which hinders learning and adaptation, an overemphasis on treating the framework as additional paperwork instead of as a planning process, difficulties in setting appropriate indicators and timelines, specifying clear goals and responsibilities, and managing the different priorities of numerous stakeholders and beneficiaries. By adopting LFAs and ToC within their approaches to finance

NAMAs, those criticisms also apply to the GCF and NAMA Facility management approaches for TC.

Building on Hermano et al.'s (2013, p. 29) claim that the LFA is '*an inefficient and limited framework for managing international development projects*', the inclusion of transformational objectives within traditional LFA-influenced approaches to manage aid is problematic. Knowing the LFA's limitations for conventional development projects, these caveats are likely to be more pronounced when imposing even wider objectives. However, the claim that the LFA's failings relate more to its misuse (Hubbard, 2001), still does not cater for the argument that its limitations lie in its rigidity and its fundamental assumptions of powers of foresight and authoritative control (Gasper 2000). By merely adding transformational objectives to traditional aid management practices, the GCF and the NAMA Facility have adopted a positivist methodology and envisage transformations as based on assumptions of linearity. This perspective is inconsistent with the aim of achieving radical, fundamental changes in developing countries, while recognizing that current structures and dynamics are not operating in a sustainable way.

Notwithstanding the limitations related to potential misapplications of the two planning approaches, the theoretical comparison undertaken in this paper stresses the key influence of how change processes are viewed. Assumptions about such processes shape the responses being proposed within the two planning approaches. Presumptions of foresight and control within the LFA, which shine through the approach adopted by the two funds, are diametrically opposed to TM's assumptions that TC processes are fundamentally unpredictable. These theoretical considerations rest on the dichotomy in change processes being viewed either as linear or as complex, with multiple causality and feedback loops.

The LFA approach also ignores the path-dependent nature of transformational processes claimed by the scientific literature on socio-technical processes. The lack of integration of co-evolutionary processes, interactivity and feedback is claimed to be conducive to promoting lock-in into sub-optimal solutions, favouring the optimization of given systems instead of system innovation (Meadowcroft 2009). This argument is particularly relevant in the context of climate change, which is recognized to be a persistent or wicked problem, characterized by uncertainty and by a multiplicity of actor interests, values and complexity (Head 2008). In his seminal paper, Unruh (2000) depicts how traditional top-down economic modelling approaches that ignore the path-dependent evolutionary nature of technological and social systems lead to carbon lock-in. By adopting a similar top-down, control-oriented management approach without adequately incorporating interactive feedback mechanisms, the approach adopted by the funds is likely to lead to lock-in at the expense of more efficient alternatives that typically unravel through lessons learnt across implementation and a change in perspectives from the actors involved.

### *5.2. Understanding TC through NAMAs in developing countries from a TM perspective*

In transition studies, TM is proposed as an approach to managing the transformation of regimes. That is, it suggests a theoretically coherent way to steer highly institutionalized means of realizing social functions away from their currently unsustainable patterns. The aim of incurring TC through climate funding entities echoes such ambitions. However, the current approaches adopted by climate funds, which are embedded in traditional LFA thinking, are

not adapted to capturing the uncertainties and complexities inherent in transitions. As a model that integrates such features, TM therefore provides constructive inspiration.

However, being a relatively new approach within transition studies based on theoretical deduction and limited empirical studies, TM exhibit caveats intrinsic to its novelty. These shortcomings have mainly been related to its assumptions of competencies of facilitation, limitations following its high level of abstraction and its associated shortcomings regarding democratic legitimacy, power and politics (Meadowcroft, 2009; Smith and Stirling, 2010; Voß, Smith, and Grin, 2009). On the other hand, despite years of established practice in development aid, the LFA has also been criticized along the same lines (section 5.1). The current preference amongst donors to stick to LFA-based approaches while expecting transformative results is thus up for debate.

Being in the early days of NAMA development, the prescriptive nature of TM offers a timely advantage in using its theoretical framework to study how interventions aimed at TC are played out in developing countries. By adopting sustainable development as a normative long-term goal, TM also incorporates UNFCCC's ultimate objectives within a scientifically coherent model that explicitly acknowledges and incorporates the social sphere in pursuing sustainability goals (Frantzeskaki et al. 2012). Yet, an application of TM in developing-country contexts can be seen as problematic. Differences in political, institutional, cultural and economic circumstances are distinctive of the developing world. Disparities and fragmentations of interests are at odds with the consensual context assumed by TM when it was developed in the Netherlands, when it was characterized by '*collaborative policy making, a focus on long term planning and innovative environmental policies'* (Loorbach, 2010, p. 162). However, the reverse argument is also valid: by moving away from engineered approaches that focus mainly on the technological and economic spheres to planning that combines top-down with bottom-up approaches, TM allows for a plurality of perspectives to be considered interactively. A closer incorporation of feedback mechanisms to inform policy re-orientation[10] and NAMA design is better able to capture the traditionally less organized political realities of developing countries. This argument is valid not only during planning stages or sporadic re-assessments of project designs that are typical of LFAs, but also across all implementation phases. Also, unplanned and unforeseen issues that typically emerge during implementation can thus be better integrated and factored in through more flexible project designs, re-assessments of objectives and the means to achieve those objectives.

Such features of open-endedness, inclusivity and equity are well adapted to better integration of the diverse ideological and geographical spreads that constitute parties to the UNFCCC. These characteristics are equally suited to the variety of in-country contexts within which NAMAs are to be framed. Issues raised regarding imposing development paradigms (Winkler and Dubash, 2015) and ill-tuned expectations between concerned actors (Fridahl et al. 2015a) can be alleviated. Additional support is found from a perspective of accountability, through TM's features for continuous assessment (Loorbach 2010), which tally with the requirement for NAMAs to be monitored, reported and verified. Concerns to do with steering modern society away from its currently high carbon lock-in towards low carbon use and sustainable development also align well with TM's strategic reorientation features, which propose a theoretically sound governance model to avoid sub-optimal solutions. By explicitly targeting a change in pathways of development based on lessons learnt within an intervention, TM thus

provides for a methodology that better integrates the complex interplay of processes from a planned development initiative aiming for high-level impacts. The commonly criticized difficulties of attribution within the development assistance literature can be attended to within a scientifically grounded model.

Clearly, the features depicted above show that TM offers a promising approach that has the potential to shed some light on the black box of implementation that traditional aid management approaches shun. However, the criticisms voiced also draw attention to its requirements for further methodological development. Indeed, how to (i) reconcile donor accountability concerns with TM's innovative open-ended approach, and (ii) contextualize the application of TM principles within developing-country contexts are issues that have remained silent in TM to date. These are avenues for further research.

## 6.0 Conclusion

### *6.1 Do traditional planning methods foster sustainability transitions?*

The concept of transformational change is rapidly gaining importance in international climate finance. Without a robust operationalization of the term and a fresh look at how to approach change processes for transformational impacts in developing countries, there is a high risk that the concept of transformational change will come across as a new donor conditionality, thus missing out on the opportunity to guide the implementation of climate action in developing countries towards ambitious goals for mitigation and sustainable development. Especially within the field of funding for climate policies and actions for NDC implementation, a lost opportunity such as this may lead to sub-optimal results, which should be avoided, considering the limited available funding.

The question raised in the article of whether traditional approaches to aid management (i.e. LFA) are able to capture the characteristics of processes of transformational change can now be answered conclusively. The critical literature review revealed the theoretical foundations of both LFA and TM approaches. Clearly, the two approaches differ at a fundamental level in their conceptualizations of processes of change. The first key conclusion is that the non-linear causality assumed within theories of sustainability transitions such as the TM approach provides a better way to capture processes of transformational change than LFA assumptions of foresight and control inherent in the approaches adopted by the climate funds. The adequacy of a TM-inspired design is illustrated in this article not only through the limitations of the LFA, but importantly also through the advantages of integrating TM features within management approaches across climate finance. Notwithstanding the potential misuse of current LFA-based management approaches, we argue that the rigidity that follows from using such a framework in the planning and evaluation of donor interventions (i) hinders learning and adaptation within NAMAs, and (ii) favours system optimization instead of system innovation. TM’s flexible features attend to such concerns and allow a more interactive consideration of the unforeseen events and changing political realities that might unfold during the implementation of NAMAs.

### *6.2 Re-packaging transformational change in climate finance for implementation of Nationally Determined Contributions*

While this article has demonstrated the benefits of a TM-inspired approach to operationalizing transformational change in developing countries through NAMAs, its findings also bears policy relevance to broader NDC processes. Indeed, NAMAs are increasingly viewed as the means to implement NDCs. However, the NAMA acronym is likely to be phased out over the long-run due to its absence within the Paris Agreement. Nevertheless, given that the policies and actions through which NAMA interventions are based upon remain essential features of any ambitious climate measures, the TM-inspired approach adopted in this paper provide useful insights that could help managing transitions through NDC planning and implementation.

Firstly, adopting a sociotechnical TM perspective suggests that TC is understood as deep, long-term, structural changes that address the root causes of carbon lock-in through a series of incremental steps. In principle, the LFA or ToC could at least be used to undertake initial planning of projects on the ground. However, country project managers have to be sensitized to the complexities and non-linear characteristics of change processes, as well as to how the implementation of climate policies and actions feeds into a longer-term system view of planned interventions for TC.

In light of the findings of this article, we also propose to include more reflexive and adaptive components. This would allow strategic re-orientation based on lessons learnt through a planned transition initiative as an alternative to the blueprint planning that characterizes both the GCF and the NAMA Facility. Furthermore, despite both funds recognizing the importance of learning mechanisms, performance management frameworks are formulated such that lessons learned are reaped across, rather than within climate interventions. TM advocates the integration of lessons learned *within* a transition initiative in order to cater for its co-evolutionary nature. Thus, the means to capture knowledge better during the implementation of a NAMA or another climate measure should see a stronger integration, so as to inform strategic action and re-orientation more interactively. In this article, we are therefore building on and expanding Mersmann and Wehnert (2015)'s call for the integration of the qualitative aspects of an envisaged transformation within an intervention design.

Finally, TM recognizes that managing transitions involves experimenting, as with technologies, practices and governance structures. Though there is a high risk of failure, the potential for gains is also claimed to be high. In that sense, policy design for TC can be viewed as a process of discovery for the actors involved, reflecting the necessary features of industrial policies involving green growth (Rodrik 2014). Hence, applying TM thinking across climate finance requires the very deliberate engagement of all the actors involved.

This article contributes to current debates within international climate policy on how to operationalize and implement transformational change processes better. With both funds being set up under the pressure of time and in highly political contexts, practical considerations may have restricted the hands of the designers of the NAMA Facility and of the GCF. Looking towards the future, the funding mechanisms may consider the points raised in this paper in order to better reflect the challenges and opportunities raised through the transformational change agenda. With the advent of the Paris Agreement in late 2015, a window of opportunity may have opened in this regard, as climate policies and actions across the world now move towards an implementation phase of political commitments set out

within Nationally Determined Contributions. Not all of them will be transformational, nor should every climate action endeavour to be. However, if countries aim at low-carbon transformation, this article provides valuable hints as to how to manage such a process.

**End Notes**

[1] For a compilation of NAMA typologies, see Table 1 in Boodoo (2014). The origins of NAMAs are described in Coetzee and Winkler (2013).

[2] Searching for conceptual clarity, 'transformational change', 'paradigm shift' and their derivatives, such as 'transformational' and 'transformative', have been considered synonymously in this paper.

[3] This transformational rhetoric is also presented as a mobilizing metaphor in the wider development community, especially through efforts to rally broad support around the Sustainable Development Goals, which were adopted consensually in September 2015 (UNGA 2012; UNGA 2015). However, this paper focuses on the context of NAMAs and its empirical application being restricted to the operationalization of TC within major climate funds.

[4] Which use the terms 'paradigm shift' and 'fundamental' change respectively essentially to describe transformational mitigation responses.

[5] Markard et al.'s (2012) analysis of 540 journal articles published between 1998 and 2011 dealing with sustainability transitions indicates a steep rise in related peer-reviewed publications, reaching between 60 to 100 academic articles annually.

[6] While TM can be used as an analytical tool with which to analyse potential interventions aiming to facilitate transitions, it has also been designed as a management approach. The LFA, on the other hand, is not solely interpreted as the classical matrix assigned to it, but rather understood as an objective-oriented planning and appraisal procedure which feeds into the logical frame matrix. In this article, we undertake a comparison of the theoretical assumptions behind TM and LFAs based on an understanding of both as management approaches.

[7] This review expands the key features of the transitions identified by (Twomey and Gaziulusoy, 2014) across new analytical categories to suit the purpose of this paper.

[8] 'Transitions', 'transitions theory' and 'transition studies' will, in this paper, refer to the body of knowledge defined in Markard et al. (2012) as 'sustainability transitions'.

[9] A search for 'transition management' on Scopus revealed between 17 and 46 new publications every year within the 2005-2014 period.

[10] Mechanisms that leave some leeway for errors and revisions of policies are also recognized as characteristics of efficient green industrial policy (Rodrik 2014).

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## Appendix 1

Scoping down the literature review through the methodology suggested in Section 2, the most influential articles covering TM's theoretical roots are presented in Table 2. TM's conceptual origins are discussed in Rotmans et al. (2001), and further academic discussions that have led to its framing as a model are covered in Kemp, Parto, and Gibson (2005), Smith et al. (2005) and Loorbach (2010). Meadowcroft (2005) and Kemp, Loorbach, and Rotmans (2007) further explored its early potential uses as a management tool, reflecting on its relevance in addressing contemporary environmental concerns, and presenting TM as a model to manage co-evolutionary processes towards sustainable development respectively. In-depth discussions pertaining to specific elements of the TM model have been covered by Wiek, Binder and Scholz (2006), who focus on the function of scenarios, Kemp, Rotmans and Loorbach (2007), who concentrate on steering features, and Späth and Rohracher (2010), who have discussed guiding visions. The limitations of the multi-level perspective as one of the bases of TM are outlined in Genus and Coles (2008). Lessons learnt from empirical TM cases are covered in Kern and Smith (2008), J.-P. Voß, Smith and Grin (2009), and Loorbach and Rotmans (2010). Avelino and Rotmans (2009), and Smith and Stirling (2010) debate at length the relationship between power and politics within TM, while reflecting on the model's limitations. Nill and Kemp (2009) make a comparison of TM with other evolutionary policy approaches, while Rotmans and Loorbach (2009) explore the model's relationship with complexity theory. Stephens, Hernandez, Román, Graham and Scholz (2008) extend TM's theoretical coverage to explore the role of higher education as a change agent. Finally, Markard et al. (2012) discuss TM's theoretical basis as one that is coherent with the body of knowledge that constitute theories of sustainable transitions.

| No. | Author | Citations | Article title | Journal title | Article's coverage of Transition Management |
|---|---|---|---|---|---|
| 1 | (Rotmans et al., 2001) | 470 | *More evolution than revolution: transition management in public policy* | Foresight | Conceptual origins of TM based on a case of low energy supply in the Netherlands |
| 2 | (Smith et al., 2005) | 446 | *The governance of sustainable socio-technical transitions.* | Research Policy | Development of the TM model based on an analysis of agency and power in the governance of regime transformation |
| 3 | (Loorbach, 2010) | 139 | *Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework* | Governance | Refinement of the TM approach and framework and definition of the theoretical basis of TM as a new governance approach for sustainable development |
| 4 | (Kemp et al., 2005) | 132 | *Governance for sustainable development: moving from theory to practice.* | International Journal of Sustainable Development | Examination of interrelationships between sustainable development and governance, including setting the basis for TM's conceptual framework |
| 5 | (Markard et al., 2012) | 121 | *Sustainability transitions: an emerging field of research and its prospects.* | Research Policy | Delineation of contours of sustainable transition theories, including how TM fits into this body of knowledge |
| 6 | (Kemp, Loorbach, et al., 2007) | 114 | *Transition management as a model for managing processes of co-evolution towards sustainable development.* | International Journal of Sustainable Development and World Ecology | Presents TM as a practical model to manage processes of co-evolution |
| 7 | (Nill and Kemp, 2009) | 104 | *Evolutionary approaches for sustainable innovation policies: from niche to paradigm?* | Research Policy | Assesses the theoretical rationale, instrumental aspects and policy constraints of evolutionary policy approaches, including TM |
| 8 | (Meadowcroft, 2009) | 98 | *What about the politics? Sustainable development, transition* | Policy Sciences | Discusses the contribution of TM to long-term socio-technical transition processes |

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| | | | *management, and long term energy transitions.* | | to sustainability, with focus on political implications |
| 9 | (Smith and Stirling, 2010) | 95 | *The politics of social-ecological resilience and sustainable socio-technical transitions.* | Ecology and Society | Focuses on TM's relationship with political dimensions of sustainability |
| 10 | (Genus and Coles, 2008) | 95 | *Rethinking the multi-level perspective of technological transitions.* | Research Policy | Analyses transition research and the limitations of the multi-level perspective as one of the basis of TM |
| 11 | (Kern and Smith, 2008) | 94 | *Restructuring energy systems for sustainability? Energy transition policy in the Netherlands.* | Energy Policy | Uses TM to analyse an energy transition project by the Dutch Ministry of Economic Affairs |
| 12 | (Loorbach and Rotmans, 2010) | 75 | *The practice of transition management: examples and lessons from four distinct cases.* | Futures | Discusses four empirical cases of TM to highlight pros and cons of attempts to manage transitions |
| 13 | (J.-P. Voß, Smith, and Grin, 2009) | 75 | *Designing long-term policy: rethinking transition management.* | Policy Sciences | Assesses TM experience and discusses its implications for long-term policy design |
| 14 | (Stephens et al., 2008) | 71 | *Higher education as a change agent for sustainability in different cultures and contexts.* | International Journal of Sustainability in Higher Education | Uses principles of TM to explore the role of higher education as a change agent in specific locations |
| 15 | (Rotmans and Loorbach, 2009) | 68 | *Complexity and Transition Management.* | Journal of Industrial Ecology | Articulates relationships between TM and complex systems theory |
| 16 | (Wiek et al., 2006) | 64 | *Functions of scenarios in transition processes.* | Futures | Focuses on the functions of scenarios within TM |
| 17 | (Meadowcroft, 2005) | 62 | *Environmental political economy, technological transitions and the state.* | New Political Economy | Reflects on TM as a means to understand and address contemporary environmental concerns |
| 18 | (Späth and Rohracher, 2010) | 58 | *'Energy regions': The transformative power of regional discourses on socio-technical futures.* | Research Policy | Uses TM to structure an analysis of guiding vision in a regional development case in Austria |

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| 19 | (Avelino and Rotmans, 2009) | 57 | *Power in Transition: An Interdisciplinary Framework to Study Power in Relation to Structural Change.* | European Journal of Social Theory | Discusses how to integrate notions of power into transition studies, especially in TM |
| 20 | (Kemp, Rotmans, et al., 2007) | 57 | *Assessing the Dutch Energy Transition Policy: How Does it Deal with Dilemmas of Managing Transitions?* | Journal of Environmental Policy and Planning | Focuses on how TM deals with steering based on Dutch government experimentations |

**Table 2. Scoped sample of the most influential peer-reviewed articles on the theoretical foundations of Transition Management.**

## Appendix 2

Applying the methodology specified in section 2, publications that explicitly discuss the theoretical basis of the LFA were covered by a wide range of journals. While most papers have built upon its utilization within traditional development aid to reflect on the approach's pros and cons, some authors have broadened its use to less conventional areas, from sports-for-development (Levermore 2011), peacebuilding activities in conflicted settings (Grove and Zwi, 2008) and health care (Dey, Hariharan, and Brookes, 2006), to the broader public sector (Wield 1999). Within the international aid-centred literature, the focus has been on different aspects of the LFA. In (Gasper 2000) and (P. Crawford and Bryce, 2003)'s influential contributions, the LFA has been examined as a planning, evaluation and management tool with respect to its potential for learning and its overall efficiency respectively. Other papers have evaluated the LFA as a method of development planning (Dale, 2003), as a programme or project cycle management, while reflecting on means to improve it based on lessons learnt from practice (Dearden and Kowalski, 2003) and as an integral element in results-based management (Armytage 2011). The implications and dynamics of using LFAs from the perspective of NGOs have been covered by (Bornstein 2003), (Bornstein 2006) and (Holma and Kontinen, 2011). Authors such as (Landoni and Corti, 2011), (Jacobs, Barnett, and Ponsford, 2010) and (Hermano et al., 2013) dig into LFA theory by comparing its application within different project management standards or tools. Other publications have zoomed onto particular aspects such as the LFA's limitations in evaluating democracy and governance (Crawford 2003), its assumptions of certainty (Curtis and Poon, 2009), the risks and external factors column of the matrix (Curtis 2001) and its philosophical origins (Bell, 2000).

| No | Author | Citations | Article title | Journal title | Article's focus and coverage of LFA |
|---|---|---|---|---|---|
| 1 | (Gasper 2000) | 71 | *Evaluating the 'logical frame approach' towards learning-oriented development evaluation* | Public Administration and Development | The article focusses on a systematic evaluation of the LFA as a planning and evaluation tool. |
| 2 | (Crawford and Bryce, 2003) | 57 | *Project monitoring and evaluation: a method for enhancing the efficiency and effectiveness of aid project implementation* | International Journal of Project Management | The article reviews the key limitations of conventional LFA for monitoring and evaluation purposes, especially as applied to international aid project management |
| 3 | (Crawford 2003) | 26 | *Promoting Democracy from Without - Learning from Within (Part I)* | Democratization | Based on a review of evaluation studies undertaken by bilateral and multilateral development agencies from Canada, US, Sweden and the EU, this article assesses the limitations of the LFA as a means of evaluating democracy and governance. |
| 4 | (Levermore 2011) | 17 | *Evaluating sport-for-development: approaches and critical issues* | Progress in Development Studies | Focussing on the extent of evaluation of sports-for-development, this article reviews the literature on development assistance, with focus on strengths and weaknesses of participatory and logical frame approaches. |
| 5 | (Bornstein 2003) | 17 | *Management Standards and Development Practice in the South African Aid Chain* | Public Administration and Development | The article focusses on the management approach adopted by South African NGOs and the extent of influence of donor conditions on such approach. It includes an assessment of the dynamics of logical frameworks. |
| 6 | (Dale, 2003) | 16 | *The logical framework: An easy escape, a straitjacket, or a useful planning tool?* | Development in Practice | The article critically evaluates the LFA as one methodology of development planning. |

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| 7 | (Bell, 2000) | 16 | *Logical frameworks, Aristotle and Soft Systems: A note on the origins, values and uses of logical frameworks, in reply to Gasper* | Public Administration and Development | Published as a note in reply to (Gasper 2000), Bell traces the philosophical origins of the LFA to Aristotle's doctrines and argues for participatory LFA approaches |
| 8 | (Dey et al. 2006) | 11 | *Managing healthcare quality using logical framework analysis* | Managing Service Quality | The paper uses the LFA as an analytical tool to study the performance of healthcare service processes and as a planning and project management methodology to propose a quality management tool within healthcare. |
| 9 | (Dearden and Kowalski, 2003) | 10 | *Programme and Project Cycle Management (PPCM): Lessons from South and North* | Development in Practice | The paper positions the LFA based as part of a broader programme and project cycle management, critically reflecting on how lessons learnt from practice could improve its application. |
| 10 | (Armytage 2011) | 8 | *Evaluating aid: An adolescent domain of practice* | Evaluation | While focussing on evaluation of development aid, this paper positions the LFA as an integral element within OECD's focus of Managing for Development Results (results-based management) and critically analyse its pros and cons. |
| 11 | (Landoni and Corti, 2011) | 8 | *The Management of International Development Projects: Moving Toward a Standard Approach or Differentiation?* | Project Management Journal | This paper compares the project management standards adopted by international development agencies from Australia, Canada, Japan, US and the EU, examining the LFA as a core tool of project cycle management. |
| 12 | (Bornstein 2006) | 8 | *Systems of accountability, webs of deceit? Monitoring and evaluation in South African NGOs* | Development | The paper discusses the LFA as the foundations of monitoring, evaluation and reporting systems used by donors, examining the effects of such systems to South African NGOs. |

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| 13 | (Grove and Zwi, 2008) | 6 | *Beyond the log frame: A new tool for examining health and peacebuilding initiatives* | Development in Practice | This article critically reflects on the logical framework matrix as applied to health and peacebuilding programs in conflicted settings. |
| 14 | (Curtis 2001) | 6 | *Finding energy in strategic project management: An essay in honour of Dean Fang* | Public Administration and Development | The paper positions the LFA as a strategic management instrument and elaborates on the risks and external factors column of the LF matrix. |
| 15 | (Hermano et al., 2013) | 5 | *How to manage international development (ID) projects successfully. Is the PMD Pro1 Guide going to the right direction?* | International Journal of Project Management | Based on identified critical success factors, this article compares the LFA methodology with another international development project management tool. |
| 16 | (Akroyd 1999) | 5 | *Logical framework approach to project planning, socio-economic analysis and to monitoring and evaluation services: a smallholder rice project* | Impact Assessment and Project Appraisal | The paper reviews the application of the logical framework approach to a rice production project in Gambia. |
| 17 | (Holma and Kontinen, 2011) | 4 | *Realistic evaluation as an avenue to learning for development NGOs* | Evaluation | Focussing on evaluation of development aid from an NGO perspective, this paper suggests an alternative to LFAs that focusses on better integrating values and learning mechanisms. |
| 18 | (Jacobs et al. 2010) | 4 | *Three Approaches to Monitoring: Feedback Systems, Participatory Monitoring and Evaluation and Logical Frameworks* | IDS Bulletin | The article compares three approaches towards monitoring development interventions, including the LFA. |
| 19 | (Curtis and Poon, 2009) | 4 | *Why a managerialist pursuit will not necessarily lead to achievement of MDGs* | Development in Practice | Based on three case studies on reform projects in Vietnam which hinge on LFA designs, this paper critically evaluate the assumptions of certainty in modern performance management. |
| 20 | (Wield 1999) | 4 | *Tools for project development within a public* | Development in Practice | This paper assesses the LFA as a tool for managing public sector activities. |

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| | | | *action framework* | | |

**Table 3. Scoped sample of the most influential peer-reviewed articles on the theoretical foundations of Logical Framework Approaches.**